

# CLAIMS

We claim:

1. A regenerable Nickel (Ni) catalyst particularly suited for a hydrocarbon reforming process, said catalyst comprising discrete Ni crystallites formed on a suitable support element by a several incipient wetness steps process and capable of withstanding at least 6 catalyst regenerations without significantly inhibiting its catalytic activity in said reforming process, said Ni crystallites being positioned on the inner surface of said suitable support element said crystallites having a crystallite characteristic dimension measured in any one direction in the range of between 10 and 1000  $\mu$  and a distribution on said support element of no more than 0.2 square meter of exposed nickel/ square meter of support surface.
2. A catalyst as defined in claim 1 wherein said support element is selected from the group comprising alumina and zeolite and other suitable supports having equivalent physical characteristics.
3. A catalyst as defined in claim 1 wherein said support element comprises alumina.
4. A catalyst as defined in claim 3 wherein said crystallite characteristic dimension measured in any one direction in the range of between 10 and 1000  $\mu$  average size and a distribution on said support element of no more than 0.2m<sup>2</sup> of exposed nickel /m<sup>2</sup> of said support surface.
5. A catalyst as defined in claim 3 wherein said average size is in the range of between 150  $\mu$  and 250  $\mu$  and a distribution on said support element of no more than 0.16 of said m<sup>2</sup> of exposed nickel / m<sup>2</sup> of said support surface.
6. A catalyst as defined in claim 4 wherein said alumina is  $\alpha$  alumina.

7. A catalyst as defined in claim 5 wherein said alumina is  $\alpha$  alumina.

8. A catalyst as defined in claim 1 wherein said support element comprises zeolite.

5 9. A catalyst as defined in claim 8 wherein said average size is in the range of between  
5  $\mu$  and 100  $\mu$  and a distribution on said support element of no more than 0.15 m<sup>2</sup>  
nickel exposed / m<sup>2</sup> of said support surface.

10 10. A catalyst as defined in claim 8 wherein said average size is in the range of between  
10  $\mu$  and 70  $\mu$  of no more than 0.10 m<sup>2</sup> nickel exposed / m<sup>2</sup> of said support  
surface.

15 11. A catalyst as defined in claim 9 wherein said zeolite is selected from the group  
consisting of NaY (sodium exchanged Y type zeolite) and USY (ultrastabilized Y  
type zeolite).

12. A catalyst as defined in claim 10 wherein said zeolite is selected from the group  
ultrastabilized Y type zeolite.

20 13. A catalyst as defined in claim 1 wherein said suitable support element has an average  
size in the range of between 5 and 200 microns.

14. A catalyst as defined in claim 1 wherein said suitable support element has an average  
size in the range of between 20 and 100 microns

25

15. A catalyst as defined in claim 6 wherein said suitable support element has an average  
size in the range of between 5 and 200 microns.

16. A catalyst as defined in claim 6 wherein said suitable support element has an average size in the range of between 20 and 100 microns.
17. A catalyst as defined in claim 7 wherein said suitable support element has an average size is in the range of between 5 and 200 microns.
18. A catalyst as defined in claim 7 wherein said suitable support element has an average size in the range of between 20 and 100 microns.
19. A catalyst as defined in claim 11 wherein said suitable support element has an average size in the range of between 5 and 200 microns
20. A catalyst as defined in claim 11 wherein said suitable support element has an average size in the range of between 20 and 100 microns.
21. A catalyst as defined in claim 12 wherein said suitable support element has an average size in the range of between 5 and 200 microns.
22. A catalyst as defined in claim 12 wherein said suitable support element has an average size in the range of between 20 and 100 microns.
23. A reforming process comprising reforming hydrocarbons in the presence of a catalyst in a reaction zone, said catalyst being Nickel (Ni) catalyst of discrete Ni crystallites formed on said support by a several step incipient wetness process, said crystallites having a maximum dimension measures in any one direction in the range of between 10 and 1000  $\mu$  and a distribution on said support element of no more than 0.2 of said square meter of nickel exposed metal/ square meter of support selected from alumina and zeolite materials recycling said catalyst to and from said reaction zone, regenerating between 10 and 100 % of the catalyst being recycled in

a regeneration zone to provide a regenerated catalyst and returning said regenerated catalyst to said reaction zone

5 24. A reforming process as defined in claim 23 wherein said support comprises zeolite and said reforming process is a dry reforming process.

25. A reforming process as defined in claim 23 wherein said support comprises alumina and said reforming process is a steam reforming process.